

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Determine whether the integral is convergent or divergent.

1) $\int_2^{\infty} \frac{14}{x^2} dx$ 1) _____

2) $\int_2^{\infty} \frac{7}{(x+1)^2} dx$ 2) _____

3) $\int_0^{\infty} 23e^x dx$ 3) _____

4) $\int_{-\infty}^0 11e^{5x} dx$ 4) _____

Evaluate the improper integral or state that it is divergent.

5) $\int_{-\infty}^{-2} \frac{2}{x^4} dx$ 5) _____

6) $\int_0^{\infty} 9e^{-9x} dx$ 6) _____

7) $\int_{-\infty}^{\infty} x^5 e^{-x^6} dx$ 7) _____

Solve the problem.

8) Capital value is defined as $\int_0^{\infty} R(t)e^{-kt} dt$ where k is the annual rate of interest 8) _____
 compounded continuously. Find the capital value of an asset that produces \$5000 yearly income at 4% compounded continuously. Round to the nearest dollar.

9) Capital value is defined as $\int_0^{\infty} R(t)e^{-kt} dt$ where k is the annual rate of interest 9) _____
 compounded continuously. Find the capital value of an asset that produces \$5000 yearly income at 5% compounded continuously. Round to the nearest dollar.

- 10) Capital value is defined as $\int_0^{\infty} R(t)e^{-kt}dt$ where k is the annual rate of interest 10) _____
 compounded continuously. Find the capital value of an asset that produces \$5000 yearly
 income at 6% compounded continuously. Round to the nearest dollar.

Find the volume generated by revolving about the x -axis the region bounded by the following graph.

- 11) $y = x$, $x = 2$, $x = 6$ 11) _____
 12) $y = \sqrt{x}$, $x = 0$, $x = 6$ 12) _____
 13) $y = x^2$, $x = 0$, $x = 4$ 13) _____
 14) $y = \sqrt{2x + 3}$, $x = 0$, $x = 1$ 14) _____
 15) $y = \frac{1}{x}$, $x = 1$, $x = 9$ 15) _____

Approximate the area under the graph of $f(x)$ over the specified interval by dividing the interval into the indicated number of subintervals and using the left endpoint of each subinterval.

- 16) $f(x) = \frac{1}{x^2}$; interval $[1, 5]$; 4 subintervals 16) _____
 17) $f(x) = x^2 + 2$; interval $[0, 5]$; 5 subintervals 17) _____
 18) $f(x) = x^3 + x^2 + 1$; interval $[0, 4]$; 4 subintervals 18) _____
 19) $f(x) = 0.5x^4 + 0.1x^3 + x^2 - 1$; interval $[1, 4]$; 3 subintervals 19) _____
 20) $f(x) = 0.1x^4 - x^2 + 3$; interval $[0, 4]$; 4 subintervals 20) _____
 21) $f(x) = 0.2x^3 + 0.3x^2 - 0.5x - 1$; interval $[2, 5]$; 3 subintervals 21) _____
 22) $f(x) = 0.2x^3 + 0.3x^2 - 0.5x + 10$; interval $[-4, -1]$; 3 subintervals 22) _____

Solve the problem.

- 23) In 1990, the world usage of natural gas was 72.137 billion cubic feet, and the demand for 23) _____
 natural gas was growing exponentially at the rate of 4% per year. If the demand continues
 to grow at this rate, how many cubic feet of gas will the world use from 1990 to 2000?
 24) In 1990 the world reserves of aluminum ore stood at 75,000,000,000 tons. World use of 24) _____
 aluminum that year was 100,000,000 tons, and the demand was growing exponentially at
 10% per year. Assuming this growth rate continues, and no new deposits of ore are
 discovered, in what year will the world reserves of aluminum ore be exhausted?

- 25) Plutonium has a decay rate of 0.003% per year. Suppose Plutonium is released into the atmosphere each year for 20 years at the rate of 2 pounds per year. What is the total amount of radioactive buildup? 25) _____
- 26) In 1980 the world use of oil was 5,000,000,000 barrels and the demand for oil was growing exponentially at the rate of 15% per year. If the demand for oil continues at this rate, how many barrels of oil will the world use from 1980 to 2000? 26) _____
- 27) Find the amount of the following continuous money flow:
 $R(t) = 2500t + 6$, $k = 6\%$, $T = 30$ years 27) _____
- 28) Find the amount of the following continuous money flow:
 $R(t) = t^2$, $k = 8\%$, $T = 20$ years 28) _____
- 29) Find the amount of a continuous money flow in which \$1000 per year is being invested at 5%, compounded continuously for 40 years. 29) _____
- 30) Find the amount of a continuous money flow in which \$100 per year is being invested at 6.5%, compounded continuously for 20 years. 30) _____

Evaluate the function.

- 31) Find $f(8, -5)$ when $f(x, y) = 7x + 3y - 3$. 31) _____
 A) 35 B) 41 C) 31 D) 38
- 32) Find $g(-7, 3)$ when $g(x, y) = 4y^2 - 9xy$. 32) _____
 A) 388 B) 385 C) 232 D) 225
- 33) Find $h(3, 6)$ when $h(x, y) = \sqrt{3x + y^2}$. 33) _____
 A) 10 B) $5\sqrt{3}$ C) 9 D) $3\sqrt{5}$
- 34) Find $f(100, 3)$ when $f(x, y) = y \log x$. 34) _____
 A) 6 B) 3 C) 60 D) 30
- 35) Find $g(3, 4)$ when $g(x, y) = \frac{x - 6y}{x^2 + y^2}$. 35) _____
 A) $-\frac{21}{25}$ B) $-\frac{5}{21}$ C) $-\frac{21}{5}$ D) $-\frac{25}{21}$

Find the domain of the function of two variables.

- 36) $f(x, y) = \frac{x}{y} + \frac{1}{y - 5}$ 36) _____
 A) $\{(x, y) \mid x \neq 0 \text{ and } y \neq 5\}$ B) $\{(x, y) \mid y \neq 0 \text{ and } y \neq 5\}$
 C) $\{(x, y) \mid y \neq 0 \text{ and } y \neq -5\}$ D) $\{(x, y) \mid x \neq 0 \text{ and } y \neq 0 \text{ and } y \neq 5\}$
- 37) $f(x, y) = ye^{\sqrt{x-9}}$ 37) _____
 A) $\{(x, y) \mid x \geq 9\}$ B) $\{(x, y) \mid x \geq 9 \text{ and } y \neq 0\}$
 C) $\{(x, y) \mid x \geq -9\}$ D) $\{(x, y) \mid x \neq 9\}$

- 38) $f(x, y) = \sqrt{7 - x^2 - y^2}$ 38) _____
 A) $\{(x, y) \mid x^2 - y^2 \leq 7\}$ B) $\{(x, y) \mid x^2 + y^2 \geq 7\}$
 C) $\{(x, y) \mid x^2 - y^2 \geq 7\}$ D) $\{(x, y) \mid x^2 + y^2 \leq 7\}$

- 39) $f(x, y) = \frac{1}{y - 8x^2}$ 39) _____
 A) $\{(x, y) \mid y \geq 8x^2\}$ B) $\{(x, y) \mid y \neq 8x^2\}$
 C) $\{(x, y) \mid y \neq -8x^2\}$ D) $\{(x, y) \mid y \geq -8x^2\}$

Solve the problem.

- 40) Production of television sets is given by $P(x,y) = 100 \left[\frac{2}{3} x^{-2/3} + \frac{2}{5} y^{-1/3} \right]^{-4}$, where x is work hours 40) _____
 and y is the amount of capital. If 64 work hours and 125 units of capital are used, what is the production output?
 A) 4564 television sets B) 4631 television sets
 C) 456,366 television sets D) 463,120 television sets
- 41) The number of cows that can graze on a ranch is approximated by $C(x,y) = 9x + 5y - 2$, where x is 41) _____
 the number of acres of grass and y the number of acres of alfalfa. If the ranch has 75 acres of alfalfa and 25 acres of grass, how many cows may graze?
 A) 798 cows B) 600 cows C) 800 cows D) 598 cows
- 42) The price-earnings ratio of a stock is given by $R(P, E) = \frac{P}{E}$, where P is the price per share of a stock, 42) _____
 and E is the earnings per share of the same stock. If the price per share of a given stock is \$240, and the earnings per share of the same stock are \$27.65, what is the price-earnings ratio of the stock? Give decimal notation to the nearest tenth.
 A) 267.7 B) 0.1 C) 6636.0 D) 8.7

Answer Key

Testname: HW5A

- 1) Convergent
- 2) Convergent
- 3) Divergent
- 4) Convergent
- 5) $\frac{1}{12}$
- 6) 1
- 7) 0
- 8) \$125,000
- 9) \$100,000
- 10) \$83,333
- 11) $\frac{208}{3}\pi$
- 12) 18π
- 13) $\frac{1024}{5}\pi$
- 14) 4π
- 15) $\frac{8}{9}\pi$
- 16) 1.4236
- 17) 40
- 18) 54
- 19) 63.6
- 20) 7.8
- 21) 21.0
- 22) 23.4
- 23) 887 billion cubic feet
- 24) 2033
- 25) 39.98 pounds
- 26) 636 billion barrels
- 27) \$4,055,864.60
- 28) \$9250.24
- 29) \$127,781.12
- 30) \$4106.61
- 31) D
- 32) D
- 33) D
- 34) A
- 35) A
- 36) B
- 37) A
- 38) D
- 39) B
- 40) C
- 41) D
- 42) D