

Name (20 pts): _____

1. Write the following functions in the form $y = kx^p$.

$$\sqrt{x}$$

$$\sqrt{\frac{9}{x^{\pi}}}$$

$$\frac{10}{x^{10}}$$

$$\sqrt[4]{16x}$$

2. Write $h(x) = e^{(2x^4+8)}$ as the composition of two functions.

3. Estimate $\lim_{x \rightarrow \infty} \left[3 + \frac{5 \ln x}{\sqrt{x}} \right]$ numerically.

4. Tell where the function graphed below is continuous.

5. Evaluate $\lim_{x \rightarrow 3} \frac{x-3}{\sqrt{x-3}}$ algebraically.

6. The height (in meters) of a GPS satellite t seconds after falling out of orbit is given by $S(t) = 400000 - 4.9t^2$. Use the definition of the derivative to find a formula for $S'(t)$.

7. Continuing the example from problem 6, interpret the meaning of $S'(30) = -294$.

8. For the function $f(x)$ graphed below, tell whether fill in the table with +, −, or 0 to indicate whether $f(x)$, $f'(x)$, and $f''(x)$ are positive, negative, or zero at the indicated x-values.

	$f(x)$	$f'(x)$	$f''(x)$
-6			
-2			
2			
6			

9. For the cost and revenue functions graphed below, use derivatives to find the value of q at which maximum profit occurs.

10. (Bonus 30 pts). Suppose a bank account pays continuously compounded interest with a doubling time of 25 years. Assuming an initial deposit of \$10,000, determine the instantaneous rate of increase of the bank account after 12 years and six months.