MATH 250/GRACEY

WORKSHEET/2.1-2.2

The limit definition of the derivative for some differentiable function *f* evaluated at *x*:

$$f'(x)=\lim_{\Delta x\to 0}\frac{f(x+\Delta x)-f(x)}{\Delta x}$$

Find the derivative of the following functions using the limit definition for the derivative.

1. $f(x)=-x^2+x-2$

2. $s(t)=\frac{4}{t^2}$

3. $y=-1$

Use the following "short-cut" rules to evaluate the derivative of the following functions. Fully simplify your result, writing as a single rational expression with positive exponents, when applicable. Identify which rule(s) you use to find each derivative.

Constant rule: $\frac{d}{dx}[c]=0$ Power rule: $\frac{d}{dx}\left[x^n\right]=nx^{n-1}$

Constant multiple rule: $\frac{d}{dx}\left[cf(x)\right]=cf'(x)$

The sum/difference of functions $\frac{d}{dx}\left[f(x)\pm g(x)\right]=f'(x)\pm g'(x)$

The sine and cosine functions: $\frac{d}{dx}[\sin x]=\cos x$ $\frac{d}{dx}[\cos x]=-\sin x$

4. $y=3x^2$

5. $f(x)=\sqrt{x}-2$

6. $g(t)=-\frac{1}{2t}+\frac{5}{t^3}$

7. $y=3x^{2/3}-8x^{3/4}+10x^{4/5}$

8. Find the equation of the tangent line at $t=\frac{\pi}{3}$ for the function $s(t)=5+\sin t-3\cos t$.