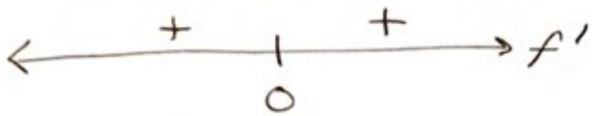
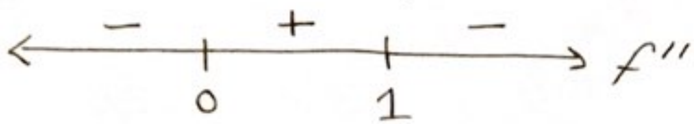
1. $f'(x) = x^2 e^{-2x}$



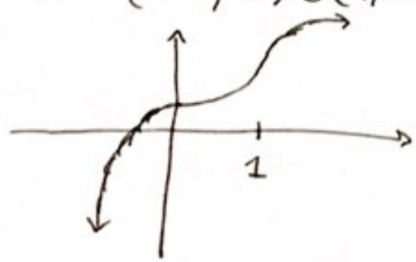
- f increasing everywhere
- f has a horizontal tangent line at $x=0$

$f''(x) = 2x\, e^{-2x}(1-x)$



- f concave up $(0,1)$
- f concave down $(-\infty,0)\cup(1,\infty)$

<u>So:</u>
- f concave up & increasing: on $(0,1)$
- f concave down & increasing: on $(-\infty,0)\cup(1,\infty)$



L23 P3

2. $f(x)$ even
$g(x)$ odd

(a) $F(-x) = \dfrac{f(-x)}{g(-x)} = \dfrac{f(x)}{-g(x)} = -F(x)$
<u>odd</u>

(b) $G(-x) = 2\cdot f(-x) = 2\cdot f(x) = G(x)$
<u>even</u>

(c) $H(-x) = f(-x)+3 = f(x)+3 = H(x)$
<u>even</u>

(d) $R(-x) = g(-x)+3 = \underbrace{-g(x)+3}_{\neq R(x) \text{ or } -R(x)}$
<u>neither even nor odd</u>

(e) $S(-x) = (g(-x))^2 = (-g(x))^2 = g(x)^2 = S(x)$
<u>even</u>

(f) $T(-x) = \sin(g(-x)) = \sin(-g(x))$
$= -\sin(g(x))$
$= -T(x)$
<u>odd</u>